

2.1987-108

c2

APPRENTICESHIP TRAINING

MOTORCYCLE MECHANIC Program




CAREER DEVELOPMENT AND EMPLOYMENT
Apprenticeship and Trade Certification

TABLE OF CONTENTS

The Goal of Apprenticeship Training	1
Basic Requirements	2
Credits	2
Benefits	2
Directions for Prospective Apprentices	3
Apprenticeship Route Toward Certification	4
Apprenticeship Committee Structure	5
Apprenticeship Committee Members	5
Procedures for Recommending Revision(s) to the Course Outline	6
Safety Education	6
Subjects and Time Distribution	8

COURSE OUTLINE

First Period Subjects	9
Second Period Subjects	18
Third Period Subjects	22
Fourth Period Subjects	24
Suggested Reference Materials	28
Technical Training Schools	28
Location of Apprenticeship and Trade Certification Regional Offices	28



Digitized by the Internet Archive
in 2017 with funding from
University of Alberta Libraries

MOTORCYCLE MECHANIC TRADE

THE GOAL OF APPRENTICESHIP TRAINING

To develop a competent tradesman who, through skill and knowledge, is capable of repair abilities required to satisfactorily service the basic as well as the technically sophisticated components of the motorcycle units being used today.

THE PRODUCT OF APPRENTICESHIP — a graduate who will:

- ★ repair and maintain motorcycles which are powered with gasoline engines.
- ★ comprehend work orders, technical bulletins and estimates, and relate the information to the job at hand.
- ★ interpret warranty policy in terms of service reports, component failures and analysis records.
- ★ when his Certificate of Proficiency has been earned, the Motorcycle Mechanic may opt to specialize in the repairing, rebuilding and servicing of any one or more of the many assemblies of the modern motorcycle.
- ★ have executive and supervisory opportunities in the motorcycle industry which are frequently available to trained and certified mechanics with above capabilities and motivation.
- ★ be able to familiarize himself with the work experience of closely allied equipment: e.g. ATVs.

MOTORCYCLE MECHANIC APPRENTICESHIP INFORMATION

Basic Requirements:

- ★ Indenture for four periods of Trade experience.
- ★ Attend a eight week technical training course in the first, and second periods and a six week technical training course in the third and fourth periods.
- ★ Fulfill the requirements for each period including 1600 hours of work experience inclusive of time spent at the training course; successfully complete the technical training course and obtain a satisfactory employer's report.
- ★ Education — a minimum requirement is the completion of grade 9 or a pass on an equivalent entrance examination as prescribed by the Trade regulation.
- ★ Age — the minimum age for apprentices is 16 years. There is no upper age limit.

Credits:

- ★ Accelerated patterns of apprenticeship may be granted for related technical training and/or experience.

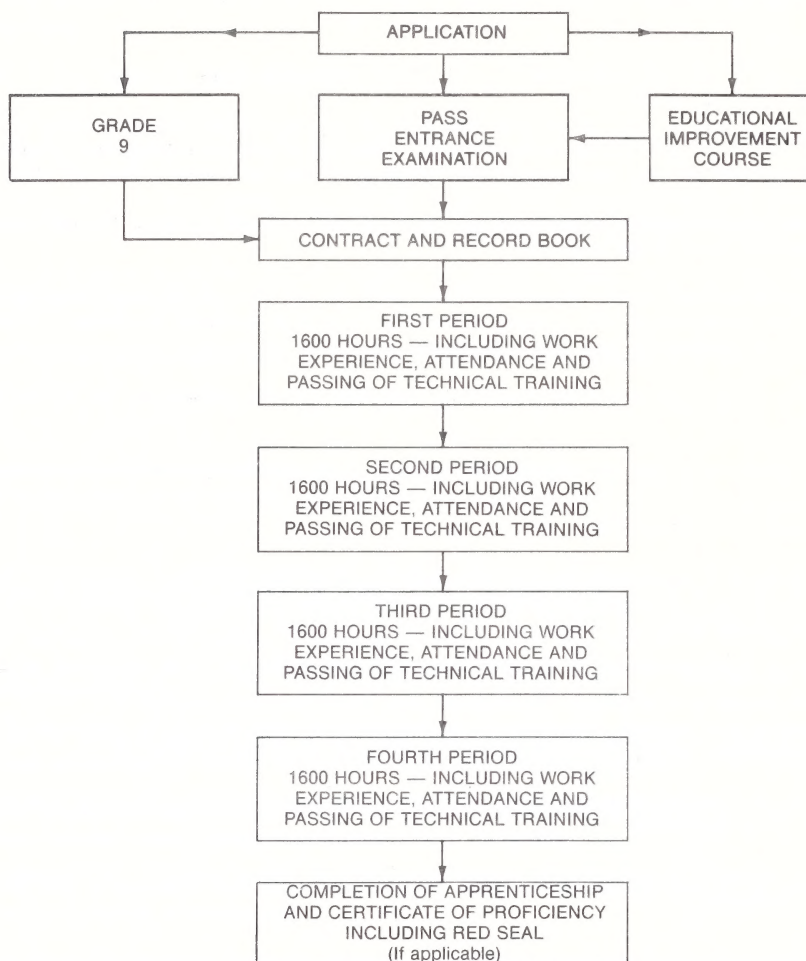
Benefits:

- ★ Apprenticeship is a learning-while-earning program. During the apprenticeship period, while working at the trade, apprentices are assured by regulation of a minimum percentage of the prevailing journeyman rate: 55% during the first period, 65% during the second period, 75% during the third period, and 90% during the fourth period. Progress from one rate to the next takes place only after successful completion of all the requirements for each period. (details are outlined in the Record Book).
- ★ All apprentices 17 years of age and older are normally eligible for training allowances while attending technical training courses. These allowances are funded by the Canada Employment and Immigration Commission.
- ★ Administrative procedures establishing the amount of training allowance is complex and can vary with an individual's circumstances. Contact a local Canada Employment Centre for details.
- ★ An apprentice who successfully completes the program will graduate with an Alberta Completion of Apprenticeship Certificate and a Certificate of Proficiency.
- ★ The most significant benefit to the graduate apprentice is that he is well trained in technical and practical aspects of the trade and is able to make a worthwhile and productive contribution to society. Society in return, will provide an opportunity for livelihood.

DIRECTIONS FOR PROSPECTIVE APPRENTICES

- ★ Contact your nearest Apprenticeship and Trade Certification office for detailed information and counselling (see list of offices on page 28).
- ★ Obtain an application form from the Apprenticeship and Trade Certification office and neatly complete, in full, the information requested of the apprentice.
- ★ Persevere in the search for apprentice employment and upon obtaining employment, give the application to the employer. It should be completed and returned to an Apprenticeship and Trade Certification office forthwith.
- ★ Any time credit, for previous experience in the Motorcycle Mechanic trade, should be discussed with the employer and requested on the application form by the employer.
- ★ Attach to the apprentice application a copy (transcript) of the marks for your last year of school. Applicants who do not have their school transcripts or a grade nine standing are required to write an entrance examination. If transcripts have been lost, contact Alberta Education for information on school transcripts.
- ★ Prepare to be called for an entrance examination following submission of your application. You will be advised of the date, time and location.
- ★ A contract of apprenticeship is entered into between the apprentice and the employer and should be signed within 90 days after the apprentice application has been approved. If contracts have not been issued within this time, contact the Apprenticeship and Trade Certification office.
- ★ Before signing the contract of apprenticeship read the complete document carefully — know your obligations and responsibilities to your employer — know the employer's obligations and responsibilities to you — feel confident you have selected the right occupation.
- ★ Know when you will be expected to attend classes and be prepared to attend. In early May of each year, School Schedules are sent to you and your employer. The employer also receives a class selection card for you, which is to be completed and submitted for scheduling. Information on procedures also accompanies the above. Confirmation on the date you actually get scheduled and/or the Official Notice will follow at the appropriate time(s).
- ★ Prepare in advance for the financial obligations required of you during school training. Reference materials and school supplies are paid for by the apprentice.
- ★ While an apprentice, it will be your responsibility to respond promptly to mailed directions and requests from Apprenticeship and Trade Certification.

APPRENTICESHIP ROUTE TOWARD CERTIFICATION



APPRENTICESHIP COMMITTEE STRUCTURE

Motorcycle Mechanic Provincial Apprenticeship Committee

The Provincial Apprenticeship Committee for the Motorcycle Mechanic Trade is comprised of members from Local Apprenticeship Committees from the cities of Calgary, Edmonton, Peace River and Red Deer.

This Committee is concerned with the policies that guide the program and make recommendations to the Apprenticeship and Trade Certification Board and the Executive Director of Apprenticeship and Trade Certification in the following areas:

- ★ Contribute current information relative to changes in the trade and requirements of industry.
- ★ Make recommendations for changes to existing trade regulations.
- ★ Assist in updating of the training program through recommendations for revisions to the course outline and attendant examinations.

Motorcycle Mechanic Local Apprenticeship Committee

Local Apprenticeship Committees are concerned with individuals and trade situations within a local region. Meetings are held throughout the year to make recommendations and to discuss problems relating to the apprenticeship program. Members who serve on committees are nominated by employer and labour organizations, and membership is equally divided into employer and employee representation in accordance with The Manpower Development Act.

Apprenticeship Committee Members:

Mr. W. E. Besler — Calgary — Employer
Mr. W. S. Healy — Calgary — Employer
Mr. M. A. Robinson — Calgary — Employer (Alternate)
Mr. B. E. Heibein — Calgary — Employee
Mr. W. L. Montgomery — Calgary — Employee
Mr. C. P. Seenandan — Calgary — Employee (Alternate)
Mr. R. P. Carter — Edmonton — Employer
Mr. P. G. Jacklin — Edmonton — Employer
Mr. D. G. Galloway — Edmonton — Employer (Alternate)
Mr. D. J. Hauck — Edmonton — Employee
Mr. G. W. Lawrence — Edmonton — Employee
Mr. G. F. Furse — Edmonton — Employee (Alternate)
Mr. C. Taylor — Peace River — Employer
Mr. T. A. Sheremeta — Peace River — Employee
Mr. R. L. Johanson — Red Deer — Employer
Mr. T. A. Morris — Red Deer — Employer
Mr. J. W. Ferguson — Red Deer — Employer (Alternate)
Mr. D. J. Richman — Red Deer — Employee
Mr. S. O. Paul — Red Deer — Employee
Mr. L. D. Sonnenberg — Red Deer — Employee (Alternate)

MOTORCYCLE MECHANIC PROGRAM COURSE OUTLINE

This outline has been prepared in accordance with recommendations from the Provincial Apprenticeship Committee for the Motorcycle Mechanic Trade in the Province of Alberta.

The outline was updated following consideration given to recommendations and suggestions from:

Local Apprenticeship Committees
Representatives from training institutes
Curriculum Sub-Committee from the Provincial Apprenticeship Committee

PROCEDURES FOR RECOMMENDING REVISION(S) TO THE COURSE OUTLINE

Any concerned citizen or group in the Province of Alberta may make recommendations for change by writing to Apprenticeship and Trade Certification, Edmonton.

It is requested that recommendations for change refer to specific areas and state references used. Recommendations received will be placed before regular meetings of the Provincial Apprenticeship Committee.

SAFETY EDUCATION

Safe working procedures and conditions, accident prevention and the preservation of health is of primary importance in the Apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of the government, employers, employees and the general public. Therefore, it is imperative that all parties become aware of circumstances that may lead to injury or harm and that safe learning experiences and environment can be created by controlling the variables and behaviors that may contribute to or cause an accident and/or an injury.

It is generally recognized that a safe attitude contributes to an accident free environment. As a result a healthy safe attitude towards accidents will benefit an employee by helping to avoid injury, loss of time and loss of pay.

A tradesman is possibly exposed to more hazards than any other person in the work force and therefore, should be familiar with the Occupational Health and Safety Act and Regulations dealing with his own personal safety and the special safety rules applying to each job.

LEGAL AND ADMINISTRATIVE ASPECTS

Employer's Responsibilities:

Accident prevention and the provisions of safe working conditions are the responsibilities of an employer. The company is responsible for:

1. The provision and maintenance of safety equipment
2. The provision of protective devices and clothing (as required by the Occupational Health & Safety Act, General Safety Regulations)
3. The enforcement of safe working procedures
4. Adequate safeguards for machinery, equipment and tools
5. Observance of all accident prevention regulations
6. Adequate training to allow a worker to use or operate equipment in an effective and safe manner.

Government's Responsibilities:

Apprenticeship and Trade Certification in conjunction with the respective Provincial Apprenticeship Committee assumes the responsibility to assure that adequate safety is reflected in the curriculum and that adequate safety instruction is presented at the training establishments.

The Occupational Health and Safety Inspection Branch assumes the responsibility for periodic inspection of the operation to ensure that regulations for industry are being correctly observed.

Individual's Responsibilities:

The employee is responsible for:

1. Knowing and working in accordance with the safety regulations pertaining to job environment and
2. Working in such a way as not to endanger himself or his fellow employees

The major factor in safety is the individual employee, his personal attitude toward safety and having an awareness of the respective safety regulation.

MOTORCYCLE MECHANIC PROGRAM

Subjects and Time Distribution

First Period	8 Weeks	30 Hours Per Week	240 Hours
Section One:	Safety		15
Section Two:	Tools		15
Section Three:	Motorcycle Assembly		15
Section Four:	Pre-Delivery Inspection		15
Section Five:	Wheel and Tire Maintenance		30
Section Six:	Brakes		45
Section Seven:	Engine Theory of 2 and 4 Cycle Engines		45
Section Eight:	Basic Electrical and Tune-Up		60
Second Period	8 Weeks	30 Hours Per Week	240 Hours
Section One:	Frames and Suspensions		30
Section Two:	Final Drives		30
Section Three:	Clutch and Primary Drives		60
Section Four:	Two Stroke Top End Reconditioning		48
Section Five:	Properties of Fuels and Lubricants		12
Section Six:	Charging and Starting Systems		60
Third Period	6 Weeks	30 Hours Per Week	180 Hours
Section One:	Cooling Systems		12
Section Two:	Four Stroke Top End Service		93
Section Three:	Advanced Electronics		75
Fourth Period	6 Weeks	30 Hours Per Week	180 Hours
Section One:	Air Induction and Filtration		22
Section Two:	Exhaust Systems and Emission Controls		8
Section Three:	Lubrication Systems		15
Section Four:	Lower End Service		60
Section Five:	Troubleshooting, Chassis and Electrical		45
Section Six:	Auxiliary Systems (Factory Installation)		20
Section Seven:	Auxiliary Systems (After Market)		5
Section Eight:	Collision Repair		5

**FIRST PERIOD TECHNICAL TRAINING
MOTORCYCLE MECHANIC
COURSE OUTLINE**

SECTION ONE:

SAFETY

15 Hours

TOPIC

COURSE OBJECTIVES

On completion of this unit the student should be able to:

A. Occupational Health and Safety

- | | |
|--|--|
| 1. Lectures from representative advisor | 1. Know Occupational Health and Safety Regulations. |
| 2. Procedures to follow to prevent accidents | 1. Observe safe working habits to prevent accidents. |
| 3. Procedures to follow in case of an accident | 1. Know what to do in case of an accident. |

B. Laws, Liabilities and Legalities

- | | |
|--|--|
| 1. Warranties, marked or explicit | 1. Know the legal ramifications involved in warranties. |
| 2. Responsibilities of mechanic in the servicing or releasing of unsafe vehicles | 1. Know the mechanic's legal responsibilities when working on obvious unsafe vehicles. |
| 3. Liability while road testing or storing customer's equipment | 1. Know the liabilities when road testing or storing customer's equipment. |

C. Fire Prevention

- | | |
|---|---|
| 1. Instruction in the use of appropriate fire extinguishers | 1. Know when to use various fire extinguishers. |
| 2. Location, marking and use of fire extinguishers | 1. Know the location of, and how to use these fire extinguishers. |

D. Storage of Fuels and Solvents

- | | |
|--|--|
| 1. Good housekeeping practices | 1. Keep storage areas clean. |
| 2. Instruction in the use of approved storage containers | 1. Identify and use approved storage containers. |
| 3. Contents of containers clearly marked | 1. Mark containers used to store fuels and solvents. |

E. Battery Storage and Servicing

- | | |
|--|---|
| 1. Acid spillage | 1. Take care when filling batteries. |
| 2. Explosive gases | 1. Know the hazards of acid gasses. |
| 3. Connections | 1. Be sure connections are tight. |
| 4. Proper charging and boosting procedures | 1. Know how to properly charge a battery. |

F. Use of Shop Press

- | | |
|-----------------------|---------------------------------------|
| 1. Press capacities | 1. Know the capacities of shop press. |
| 2. Safety precautions | 1. Use guards around press. |

TOPIC

COURSE OBJECTIVES

G. Use of General Shop Equipment

- | | |
|----------------------|--|
| 1. Motorcycle hoists | 1. Know how to use the motorcycle hoists. |
| 2. Impact tools | 1. Know how to use and care for impact tools. |
| 3. Engine stands | 1. Know how to mount an engine in an engine stand. |

H. Oxy-Fuel Torch

- | | |
|---------------------------|---|
| 1. Gases | 1. Be familiar with the various gases used for cutting and heating. |
| 2. Cylinders and fittings | 1. Know how to care for cylinders whether empty or full. |
| 3. Regulators and hoses | 1. Attach regulators and hoses properly to appropriate cylinders. |
| 4. Torch and attachments | 1. Be familiar with the cutting torch and heating attachments. |
| 5. Basic techniques | 1. Demonstrate basic techniques of cutting and heating. |

I. Steam or High Pressure Hot Water Cleaning

- | | |
|--------------------------------------|---|
| 1. Dangers of high pressure steam | 1. Know the hazards of high pressure steam. |
| 2. Cleaning compounds | 1. Use cleaning compounds safely. |
| 3. Start up and shut down procedures | 1. Know how to safely start up and shut down high pressure washers. |

J. Use of Compressed Air

- | | |
|-----------------------------------|---|
| 1. General safety and maintenance | 1. Know the hazards of high pressure air. |
| 2. Proper eye protection | 1. Use proper eye protection. |
| 3. Air varsol cleaning procedure | 1. Know how to use air varsol cleaning equipment. |
| 4. Safety goggles | 1. Wear safety goggles in the shop at all times. |
| 5. Hand protection | 1. Wear gloves when working with high pressure air equipment. |

SECTION TWO:

TOOLS

15 Hours

A. Hand Tools

1. Use the various hand tools used in the trade, such as:
 - (a) wrenches
 - (b) socket sets
 - (c) pliers
 - (d) screwdrivers
 - (e) hammers
 - (f) allen wrenches
 - (g) snap ring pliers
 - (h) files
 - (i) punches and chisels
 - (j) hack saws
 - (k) pry bars
 - (l) impact driver

B. Electrical Testing and Service Tools

1. Know how to use the following electrical testing equipment:
 - (a) multimeters, digital and analog
 - (b) voltmeters
 - (c) ammeters
 - (d) continuity testers
 - (e) battery chargers
 - (f) ignition tester
 - (g) timing light

C. Cleaning Tools

1. Use the following cleaning tools:
 - (a) degreasing tanks
 - (b) aerosol tanks
 - (c) chemical gasket stripper
 - (d) scrapers
 - (e) wire wheels
 - (f) dry blasting

D. Measuring Tools

1. Be proficient in the use of the following measuring tools:
 - (a) machinist rules and straight edge
 - (b) tape measure
 - (c) outside micrometer
 - (d) inside micrometer
 - (e) depth micrometer
 - (f) Calipers — vernier, dial and digital
 - (g) telescoping gauge
 - (h) dial indicator
 - (i) small hole gauges
 - (j) feeler gauges
 - (k) compression gauge
 - (l) vacuum gauge
 - (m) torque wrench
 - (n) tire gauges

E. Engine Service and Repair Tools

1. Identify and use the following engine service tools:
 - (a) engine stand
 - (b) valve and valve refinishing equipment
 - (c) cylinder deglazer
 - (d) rigid hone and boring bar
 - (e) stethoscope
 - (f) valve spring testers
 - (g) piston ring expanders
 - (h) bushing and seal installation tools
 - (i) pullers
 - (j) crankcase leak tester
 - (k) torque wrenches

F. Special Service Tools

1. As designated by individual factory service manuals
1. Identify and use special service tools as required.

G. Tune-Up Tools

1. Identify and use the following tune-up tools:
 - (a) vacuum gauges
 - (b) synchronization adjustment wrench
 - (c) float level gauges
 - (d) jet wrenches
 - (e) fuel pressure gauges
 - (f) valve adjustment tools

H. Wheel, Suspension and Frame Service Tools

1. Be familiar with and able to use the following wheel, suspension and frame service tools:
 - (a) tire pressure gauges
 - (b) core tool
 - (c) hook spanner wrenches
 - (d) chain breaker
 - (e) fork/shock pressure wrench
 - (f) tire irons
 - (g) spoke wrenches
 - (h) strap wrenches
 - (i) wheel truing stands
 - (j) tire changing and balancing tools

I. Power Hand Tools

1. Use and properly care for power hand tools such as:
 - (a) electric impact wrenches
 - (b) air impact wrenches
 - (c) air ratchets
 - (d) rotary grinders and buffers
 - (e) electric drills

J. Miscellaneous Tools

1. Identify and use miscellaneous tools as required in the shop:
 - (a) taps and dies
 - (b) adjustable small mirrors
 - (c) magnet pickups
 - (d) safety glasses and goggles
 - (e) screw extractors
 - (f) drill press, drill bits and sharpening procedures
 - (g) spark plug viewer
 - (h) pin spanner
 - (i) thread chasers and files
 - (j) tin snips
 - (k) flex stone
 - (l) cotter pin puller
 - (m) anti-freeze and battery tester

K. Machining Equipment

1. Lathe

1. Use a lathe for minor machining purposes.

L. General Shop Equipment

1. Use the following general shop equipment:
 - (a) pressure washer — application and usage
 - (b) air compressor
 - (c) wet/dry vacuum
 - (d) propane torch
 - (e) oxy-fuel torch
 - (f) motorcycle lift
 - (g) vises
 - (h) bench grinder
 - (i) stone dresser
 - (j) jacks
 - (k) oven
 - (l) hot air gun

TOPIC	COURSE OBJECTIVES	
SECTION THREE:	MOTORCYCLE ASSEMBLY	15 Hours
A. Care in Unloading and Uncrating New Machines		
1. Proper use of materials handling equipment	1. Use fork lifts or hoists to load and unload equipment.	
B. Reporting Shipment Damage		
	1. Check incoming shipments and wherever possible: (a) check for obvious visual damage (b) if crate is damaged, uncrate in presence of freight hauler and note damage on delivery slip	
C. Check Parts Component List		
	1. Uncrate and: (a) note missing or duplicate parts	
D. Refer to Assembly Instructions		
	1. Assemble a new bike being careful to: (a) follow instructions explicitly (b) ensure proper routing of cables and wiring	
SECTION FOUR:	PRE-DELIVERY INSPECTION (P.D.I.)	15 Hours
A. Refer to Manufacturers P.D.I. Checklist		
	1. Perform pre-delivery inspections as per manufacturers specifications.	
	2. May include but not restricted to: (a) check all oil levels (b) check coolant level and specific gravity, if applicable (c) check battery level and specific gravity, if applicable (d) check drive chain or belt adjustment if applicable (e) check wheel nut torque (f) check brake and clutch adjustment (g) check tire pressure	
SECTION FIVE:	WHEEL AND TIRE MAINTENANCE	30 Hours
A. Types of Wheels		
	1. Identify the types of wheels used in industry: (a) wire wheels (b) cast wheels (c) stamped wheels	
B. Wheel Inspection		
	1. Know how to do a proper wheel inspection: (a) check for damaged bearings and dust seals (b) check wheel and hub for dents, cracks, damaged threads and corrosion (c) check for bent, broken, or loose spokes (d) measure runout	

C. Wheel Servicing

1. Perform complete wheel servicing including the following:
 - (a) remove and replace wheel bearings
 - (i) method of cleaning and checking for damaged bearing
 - (ii) repacking and reassembly procedures
 - (iii) lubricants
 - (b) replacing and tightening spokes
 - (c) replacing rim or hub
 - (d) lacing and truing wheel assembly

D. Tire Changing

1. Change tires properly by:
 - (a) demounting, use of tire irons and tire changers
 - (b) tire inspection
 - (c) repairing a flat tire (tube and tubeless type)
 - (d) remounting and directional indication if applicable
 - (e) use of bead lock
 - (f) balance tire and wheel assembly
 - (g) tire applicability, sizes, designs

SECTION SIX:**BRAKES****45 Hours****A. Nomenclature**

1. Know the names and location of parts used in brake systems:
 - (a) mechanical
 - (b) hydraulic

B. Hydraulic Theory

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Pascal's Law 2. Brake fluid designations and specifications 3. Hygroscopicity | <ol style="list-style-type: none"> 1. State Pascal's Law. 1. Name the types of brake fluids and describe their limitations. 1. Define hygroscopicity. |
|--|--|

C. Brake Design

1. Define the following brake designs:
 - (a) drum brakes
 - (b) disc brakes — internal and external

D. Brake Inspection, Maintenance and Repair

1. Inspect, maintain and repair brakes as follows:
 - (a) drum brakes — hydraulic and mechanical
 - (i) check brake lever, pedal and return springs
 - (ii) check brake cables and rods, clevises and linkages
 - (iii) check brake light switches
 - (iv) check brake cam arm, spindle and backing plate torque arm
 - (v) cleaning procedures — asbestosis
 - (vi) clean and inspect all internal parts
 - (vii) check drum wear
 - (viii) relining brake shoes
 - (ix) hydraulic system inspection and repair
 - (x) reassembly procedures
 - (b) disc brakes — mechanical and hydraulic
 - (i) check caliper mounting brackets
 - (ii) check master cylinder linkage and fluid level
 - (iii) check torque arm

TOPIC

COURSE OBJECTIVES

- (iv) check wheel bearings and dust seals
- (v) check brake light switches
- (vi) check brake pad thickness
- (vii) check brake disc
- (viii) brake pad replacement
- (ix) inspect hoses and lines

E. Changing and Bleeding Brake Fluid and Hoses

1. Change brake hoses and know the proper procedure to bleed brake systems.

F. Master Cylinder, Caliper and Wheel Cylinder Rebuilding

1. Rebuild the following cylinders:
 - (a) master cylinder
 - (i) remove and dismantle
 - (ii) clean and inspect all parts
 - (iii) measure for wear and return spring length
 - (iv) replace parts as required
 - (v) reassembly procedures
 - (b) caliper
 - (i) remove and dismantle
 - (ii) clean and check all parts
 - (iii) measure for wear
 - (iv) replace parts as required
 - (v) reassembly procedures
 - (c) wheel cylinder
 - (i) remove and dismantle
 - (ii) clean and check all parts
 - (iii) measure for wear
 - (iv) replace parts as required
 - (v) reassembly procedures

SECTION SEVEN:

ENGINE THEORY OF 2 AND 4 CYCLE ENGINES

45 Hours

A. 2 Cycle

1. Define the following basics of two cycle engines:
 - (a) theory
 - (b) fuel oil mixtures
 - (c) port timing
 - (d) piston port
 - (e) reed valve
 - (f) rotary valve
 - (g) variable port timing
 - (h) crankcase sealing
 - (i) single and multicylinder engines
 - (j) piston and ring design
 - (k) transfer cutouts (piston and cylinder)
 - (l) types of cylinder sleeves

B. 4 Cycle

1. Define the following basics of four cycle engines:
 - (a) theory
 - (b) valve train
 - (c) push rod type
 - (d) single overhead camshaft
 - (e) double overhead camshaft
 - (f) desmodromic valve operation

- (g) camshaft designs and driving systems
- (h) single and multicylinder engines
- (i) cylinder design
- (j) piston design
- (k) piston ring design
- (l) combustion chamber design

SECTION EIGHT:**BASIC ELECTRICAL AND TUNE-UP****60 Hours****A. Introduction to Electrical Theory**

- | | |
|------------------------------------|--|
| 1. Electrical terminologies | 1. Know electrical nomenclature. |
| 2. Ohm's law, volts, amps, ohms | 1. Define Ohm's law. |
| 3. Conductors and insulators | 1. Define conductors and insulators. |
| 4. Circuit types, series, parallel | 1. Identify simple series and parallel circuits. |
| 5. Shorts, opens, grounds | 1. Identify shorts, opens and grounds in simple circuits. |
| 6. Use of test meters | 1. Explain the use of the voltmeter, ammeter and ohmmeter. |

B. Battery

- | | |
|---|---|
| 1. Construction and materials | 1. Explain the construction and operation of the lead-acid battery. |
| 2. Servicing and testing — new and used | 1. Perform recommended battery testing and servicing operations. |
| 3. Specific gravity | 1. Perform specific gravity test. |
| 4. Recharging, hazards and handling, charging rate 1/10 amp hour rate | 1. Know the proper procedures to handle and charge batteries. |
| 5. Sulphation | 1. Define sulphation. |
| 6. Freezing precautions | 1. Know the precautions to take to prevent freezing. |
| 7. Storage | 1. Describe proper storage procedures. |

C. Electrical Circuits

- | | |
|---|--|
| 1. Schematics and symbols | 1. Read a schematic and identify the various symbols. |
| 2. Use of test meters | 1. Use the various test meters. |
| 3. Lighting circuit — testing bulbs, adjustment of brake light switch | 1. Identify and test bulbs, lighting and brake circuits. |
| 4. Basic turn signal circuit | 1. Define a basic turn signal circuit. |
| 5. Horn circuit | 1. Define a basic horn circuit. |
| 6. Basic charging circuit | 1. Define a basic charging circuit. |
| 7. Basic starting motor circuit | 1. Define a basic starting motor circuit. |
| 8. Basic ignition circuit | 1. Define a basic ignition circuit. |
| 9. Basic warning and indicator circuits | 1. Define the basic warning and indicator circuits. |

D. Engine Compression

- | | |
|----------------------------------|---|
| 1. Use of compression gauge | 1. Use a compression gauge. |
| 2. Wet and dry compression tests | 1. Perform wet and dry compression tests. |
| 3. Leak down tests | 1. Perform leak down tests. |

E. Ignition System Tune-Up

- | |
|------------------------------------|
| 1. Perform basic ignition tune-up. |
|------------------------------------|

TOPIC

COURSE OBJECTIVES

F. Spark Plugs

1. Replace spark plugs.

G. Points Replacement and Adjustment

1. Replace and adjust points.

H. Auto Advance Systems

1. Adjust auto advance systems.

I. Dwell and Timing

1. Adjust dwell and timing.

J. Basic Valve Adjustment

1. Perform basic valve adjustment:
(a) other than shim under bucket type or desmodromic

K. Cam Chain Adjustment

1. Adjust cam chain.

L. Control Cable Lube and Adjustment

1. Lube and adjust control cables.

M. Primary Chain or Belt Adjustment

1. Adjust primary chain or belt.

N. Drive Chain or Belt Adjustment

1. Adjust drive chain or belt.

O. Basic Carburetor Theory and Adjustment

1. Define basic carburetor theory and perform necessary adjustments.

**SECOND PERIOD TECHNICAL TRAINING
MOTORCYCLE MECHANIC
COURSE OUTLINE**

SECTION ONE:

FRAMES AND SUSPENSIONS

30 Hours

TOPIC

COURSE OBJECTIVES

On completion of this unit the student should be able to:

A. Frame Types and Materials

1. Identify the types of frames and materials of manufacture such as:
 - (a) cradle
 - (b) backbone
 - (c) stamped
 - (d) other

B. Front Suspension Types

1. Identify and repair front suspension types as described below:
 - (a) telescoping forks
 - (i) fork tubes
 - (ii) clamps
 - (iii) spindle
 - (iv) fork sliders
 - (v) damper systems
 - (vi) fork operation
 - (vii) spring types
 - (viii) air assist systems
 - (b) anti-dive forks
 - (i) design and function
 - (c) other (Earle's type)

C. Steering Geometry

- | | |
|---|---|
| <ol style="list-style-type: none">1. Rake2. Trail3. Offset4. Steering damper systems | <ol style="list-style-type: none">1. Define rake.1. Define trail.1. Define offset.1. Repair steering damper systems. |
|---|---|

D. Servicing Front Suspension

- | | |
|---|--|
| <ol style="list-style-type: none">1. Changing fork oil2. Changing fork seals3. Steering head bearings4. Rebuilding forks | <ol style="list-style-type: none">1. Change fork oil.1. Change fork seals.1. Replace steering head bearings.1. Rebuild front forks. |
|---|--|

E. Rear Suspension

1. Repair rear suspension units such as:
 - (a) swing arm
 - (b) single shock system
 - (c) dual shock system
 - (d) refillable/rebuildable shock units

SECTION TWO:

FINAL DRIVES

30 Hours

A. Final Drive Designs

1. Repair the various types of final drives and assemblies such as:
 - (a) chain drive

TOPIC

COURSE OBJECTIVES

- (i) sprockets, R and R
- (ii) roller chain, design, types, size, designation, and wear limits
- (b) belt drive
 - (i) sprockets
 - (ii) belts
 - (iii) adjustment
 - (iv) replacement
- (c) shaft drive
 - (i) output shaft drive
 - (ii) spline coupling
 - (iii) universal joint
 - (iv) drive shaft and swing arm
 - (v) pinion and ring gears
 - (vi) housing
 - (vii) maintenance
 - (viii) overhaul

B. Rear Cush Drive

- | | |
|---|---|
| 1. Other drive train cushioning devices | 1. Repair other drive train cush devices as required. |
|---|---|

SECTION THREE:

CLUTCH AND PRIMARY DRIVES

60 Hours

A. Clutch Systems

- | | |
|------------------------|--|
| 1. Theory of operation | 1. Know the theory of operation of clutch systems such as: <ul style="list-style-type: none"> (a) wet, multiplate (b) dry (c) centrifugally controlled (d) other (hydraulic, torque converter) |
| 2. Release mechanisms | 1. Know the operational functions of clutch release mechanisms: <ul style="list-style-type: none"> (a) mechanical (b) hydraulic |
| 3. Servicing | 1. Service clutch systems such as: <ul style="list-style-type: none"> (a) friction materials (b) mechanical components (c) hydraulic systems |

B. Kickstart Systems

- 1. Be proficient with kickstart systems:
 - (a) theory of operation
 - (i) primary drive
 - (ii) transmission drive
 - (b) servicing
 - (i) return springs
 - (ii) diagnostic procedures

C. Primary Drives

- 1. Be proficient with primary drives:
 - (a) theory of operation
 - (i) power transmission systems
 - simplex, duplex, triplex and hyvo chains
 - straight cut gears
 - helical cut gears
 - other
 - (ii) cush drives
 - (b) servicing

SECTION FOUR:**TWO STROKE TOP END RECONDITIONING****48 Hours****A. Clean the Vehicle**

1. Pressure washer

1. Clean the bike with a pressure washer.

B. Diagnosis

1. Diagnose the problem properly.

C. Remove Accessories, Head and Cylinder

1. Remove the head, cylinder and accessories as necessary.

D. Decarbonizing and Cleaning

1. Decarbonize and clean as required.

E. Piston and Cylinder Inspection and Measurement

1. Perform piston and cylinder inspection and measurements as required:
 - (a) service limits
 - (b) inspection and servicing of variable exhaust port systems and variable volume systems

F. Reed and Rotary Valve Inspection

1. Inspect and diagnose reed and rotary valves.

G. Reconditioning Procedures

1. Perform reconditioning procedures as required.

H. Engine Reassembly

1. Complete top end reconditioning and reassembly.

SECTION FIVE:**PROPERTIES OF FUELS AND LUBRICANTS****12 Hours****A. Fuels**

1. Define the properties of fuel.

B. Lubricants

1. Define lubricant properties.

C. Pre-Mix Ratios

1. Know the fuel to oil pre-mix ratios.

SECTION SIX:**CHARGING AND STARTING SYSTEMS****60 Hours****A. Alternator**

1. Be familiar with alternator:
 - (a) theory of operation
 - (i) permanent magnet single phase
 - (ii) permanent magnet three phase
 - (iii) electromagnetic rotor three phase
 - (iv) regulation systems
 - (b) recognition of components
 - (i) location of components
 - (c) testing procedure
 - (i) use of test equipment

TOPIC

COURSE OBJECTIVES

- (ii) stator
- (iii) rotor
- (iv) rectifier assembly (diodes)
- (v) slip ring and brushes
- (vi) regulators
- (d) electric starting systems
 - (i) starting motors
 - (ii) starting gear and clutches
 - (iii) bendix drives
 - (iv) starter safety interlocks
 - (v) starter solenoids

**THIRD PERIOD TECHNICAL TRAINING
MOTORCYCLE MECHANIC
COURSE OUTLINE**

SECTION ONE:

COOLING SYSTEMS

12 Hours

TOPIC

COURSE OBJECTIVES

On completion of this unit the student should be able to:

A. Air Cooling

1. Radiant
2. Fan forced

1. Define radiant cooling.
1. Define fan forced cooling.

B. Liquid Cooling

1. Be familiar with and able to repair liquid cooling components:
 - (a) principle of operation
 - (b) coolants — ratios — corrosions — inhibitors
 - (c) water pumps
 - (d) thermostats
 - (e) bleeding of system
 - (f) fans, thermostatic and direct drive

C. Other (Oil Cooling)

1. Repair other types of cooling systems such as oil coolers.

SECTION TWO:

FOUR STROKE TOP END SERVICE

93 Hours

A. Clean the Vehicle

1. Clean the bike properly.

B. Diagnosis

1. Diagnose the problem.

C. Remove Engine (as required)

1. Remove and repair the engine as follows:
 - (a) drain fluids
 - (b) disconnect electrical system
 - (c) disconnect control cables
 - (d) remove air box, carburetors and exhaust system (as required)
 - (e) disconnect final drive
 - (f) remove mounting bolts
 - (g) remove engine
 - (h) disassemble top end (as required)
 - (i) overhead cam drive systems
 - (ii) push rod systems
 - (iii) rocker arms
 - (iv) desmodromic
 - (v) other
 - (i) remove head(s) and cylinder(s)
 - (j) decarbonize and clean
 - (k) measure parts
 - (l) recondition or replace parts (as necessary)
 - (m) recondition valves and seats (as required)
 - (n) recondition cylinders
 - (o) final top end reassembly
 - (p) install engine

SECTION THREE:**ADVANCED ELECTRICAL****75 Hours****A. Use of Test Equipment**

1. Be proficient in the use of test equipment.

B. Battery and Coil Ignition System (Kettering)

1. Be familiar with the battery and coil ignition system:
 - (a) identification of components
 - (b) theory of operation
 - (c) test procedures
 - (d) service procedures

C. Magneto Ignition

1. Be familiar with the magneto ignition system:
 - (a) identification of components
 - (b) theory of operation
 - (c) test procedures
 - (d) service procedures

D. Electronic Ignition

1. Be familiar with electronic ignition systems:
 - (a) contact controlled systems
 - (b) magnetically controlled systems
 - (c) capacitor discharge systems/switched systems
 - (d) test procedures
 - (e) service procedures

E. Ignition, Kill, Interlock Switch Systems

1. Define the various ignition switches and others.

F. Generators

1. Identify and repair the various types of generators:
 - (a) similarities of generators and starting motors
 - (b) testing procedures
 - (c) service procedures

**FOURTH PERIOD TECHNICAL TRAINING
MOTORCYCLE MECHANIC
COURSE OUTLINE**

SECTION ONE:	AIR INDUCTION AND FILTRATION	22 Hours
TOPIC	COURSE OBJECTIVES	
	On completion of this unit the student should be able to:	
A. Air Filters	<ol style="list-style-type: none">1. Know when and how to service the various types of air filters:<ol style="list-style-type: none">(a) paper filters(b) foam type air cleaners(c) other	
B. Carburetion	<ol style="list-style-type: none">1. Repair and adjust all types of carburetor systems:<ol style="list-style-type: none">(a) carburetor systems<ol style="list-style-type: none">(i) venturi principle(ii) slide controlled (variable venturi)(iii) vacuum controlled (constant vacuum)(iv) butterfly controlled (fixed venturi)<ul style="list-style-type: none">— carburetor overhaul— synchronization and adjustment(v) enrichment systems	
C. Fuel Injection	<ol style="list-style-type: none">1. Theory2. Maintenance and repair	<ol style="list-style-type: none">1. Know the theory of fuel injection systems.1. Do basic maintenance and repairs.
D. Normal Aspiration	<ol style="list-style-type: none">1. Know the theory of normally aspirated engines.	
E. Super Charging and Turbocharging	<ol style="list-style-type: none">1. Superchargers (theory only)2. Turbocharging	<ol style="list-style-type: none">1. Know the theory of superchargers.1. Be familiar with turbochargers:<ol style="list-style-type: none">(a) maintenance and repair(b) control systems
SECTION TWO:	EXHAUST SYSTEMS AND EMISSION CONTROLS	8 Hours
A. Exhaust Pipes	<ol style="list-style-type: none">1. Identify the different types of exhaust pipes:<ol style="list-style-type: none">(a) 2 stroke type<ol style="list-style-type: none">(i) variable volume(b) 4 stroke type(c) siamesed or collector types	
B. Mufflers	<ol style="list-style-type: none">1. Be familiar with muffler:<ol style="list-style-type: none">(a) design(b) diagnosis and service(c) spark arrestors	
C. Exhaust Gas Analysis	<ol style="list-style-type: none">1. Use of exhaust gas analyzer	<ol style="list-style-type: none">1. Use and interpret an exhaust gas analyzer.

TOPIC	COURSE OBJECTIVES	
SECTION THREE:	LUBRICATION SYSTEMS	15 Hours
A. Oil Pumps		
1. Bearing types and lubrication requirements	1. Know the lubrication requirements of the various bearing types.	
2. Oil pump types	1. Identify and repair the following oil pump types: <ul style="list-style-type: none"> (a) gear (b) piston (c) trochoid 	
3. Wet and dry sump systems	1. Identify wet and dry sump systems.	
B. Filtration Systems		
	1. Identify and repair the following filtration systems: <ul style="list-style-type: none"> (a) full and partial flow (b) centrifugal filters (c) paper elements (d) other 	
C. Lubrication Circuits		
	1. Identify and service the following lubrication circuit valves: <ul style="list-style-type: none"> (a) relief valves (b) bypass valves (c) metering orifices 	
D. Checking Oil Pressure		
	1. Verify proper oil pressure.	
E. 2-Stroke Lubrication		
	1. Be familiar with 2-stroke lubrication: <ul style="list-style-type: none"> (a) premix ratios (b) automatic mixing systems (c) gearbox requirements 	
SECTION FOUR:	LOWER END SERVICE	60 Hours
A. Single and Multicylinder Engines		
	1. Repair transmission and primary drives as follows: <ul style="list-style-type: none"> (a) clean the vehicle (b) diagnosis (c) remove engine (d) remove top end and accessories (as required) (e) split case <ul style="list-style-type: none"> (i) horizontal cases (ii) vertical cases (f) remove crankshaft (g) remove transmission (as required) (h) inspection <ul style="list-style-type: none"> (i) crankshaft and bearings (ii) connecting rods and bearings (iii) transmission gears, shaft and bearings (iv) gear selector mechanisms (v) internal kick starters (vi) internal primary drives (i) recondition or replace parts (as necessary) (j) disassembly, repair and truing up of "pressed up" crankshafts (k) reassembly 	

SECTION FIVE:**TROUBLESHOOTING, CHASSIS AND ELECTRICAL****45 Hours****A. Types of Problems and How to Troubleshoot**

1. Be proficient in the skill of troubleshooting:
 - (a) diagnose the problem
 - (i) permanent failures
 - (ii) intermittent failures
 - (b) Identify the system
 - (i) mechanical
 - (ii) electrical
 - (iii) fuel and air
 - (c) use of test equipment
 - (d) determine cause of failure
 - (e) make necessary repairs
 - (f) verify problem is permanently corrected

SECTION SIX:**AUXILIARY SYSTEMS (FACTORY INSTALLATION)****20 Hours**

NOTE: All electronic diagnosis to emphasize troubleshooting and the reading of schematics:

A. Air Compressor

1. Repair air compressor.

B. Radios and Intercoms

1. Test radios and intercoms.

C. Cruise Control

1. Test cruise controls.

D. Instrumentation

1. Test control instruments.

E. On Board Computers

1. Test on board computers.

F. Digital Readouts

1. Test digital readout systems.

G. Levelling System

1. Repair levelling systems.

H. Other

1. Test or repair other systems as required.

SECTION SEVEN:**AUXILIARY SYSTEMS (AFTER MARKET)****5 Hours****A. Sidecar Installation (Legalities)**

1. Know how to install a sidecar and the legalities involved.

B. Trailer Hitches (Legalities)

1. Know the legalities involved in installing trailer hitches.

SECTION EIGHT:**COLLISION REPAIR****5 Hours****A. Estimating**

1. Write up a proper estimate for collision repairs.

B. Hidden Damage

1. Anticipate and include costs for hidden damage.

C. Replacement of Parts

1. Make necessary repairs.

D. Road Test

1. Perform a satisfactory road test.

SUGGESTED REFERENCE MATERIALS

Motorcycles — Fundamentals, Service, Repair — Johns/Edmundson — Goodheart Willcox

Modern Motorcycle Mechanic — J. B. Nicholson, Nicholson Bros.

Motorcycle Operation & Service — Webster & Dutnam — Prentice Hall

TECHNICAL TRAINING SCHOOLS

The Motorcycle Mechanic apprenticeship training program is offered by Alberta Career Development and Employment, Apprenticeship and Trade Certification. Staff and facilities for teaching the program are supplied by:

1. Fairview College

LOCATION OF APPRENTICESHIP AND TRADE CERTIFICATION REGIONAL OFFICES

BONNYVILLE

CALGARY

EDMONTON

FORT McMURRAY

GRANDE PRAIRIE

HINTON

LETHBRIDGE

MEDICINE HAT

PEACE RIVER

RED DEER

VERMILION

N.L.C. - B.N.C.



3 3286 07500097 2

4978